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# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
222 S. Houston, Suite A
Tulsa, Oklahoma 74127

October 29, 1998

#2-14-98-I-82

Ms. Gloria Manning, Acting Regional Forester
U.S. Forest Service
Southern Region
1720 Peachtree Road, NW
Atlanta, Georgia 30367

Dear Ms. Manning:

Enclosed for your review is the Fish and Wildlife Service's draft Biological Opinion concerning impacts of continued forest management activities in the Ouachita National Forest. On December 3, 1997, the Fish and Wildlife Service, concurred with your October 23, 1997 request for formal consultation under Section 7 of the Endangered Species Act, as amended. After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of forest management and other activities presented in the Ouachita National Forest's biological assessment, it is the Service's biological opinion that forest management and other activities authorized, funded, or carried out on the Ouachita National Forest, are not likely to jeopardize the continuing existence of the Indiana bat.

We will finalize the biological opinion within 30 days of receiving the Forest Service comments. We appreciate the opportunity to work with you, your staff, and personnel of the Ouachita National Forest. If you have any questions, please contact Steve Hensley at (918) 581-7458 ext. 227.

Sincerely,

Charles M. Scott

for Jerry J. Brabander
Field Supervisor

cc:
Field Supervisor, Fish and Wildlife Service, Conway Ecological Services Field Office, Thomas Conway, AR
Field Supervisor, Fish and Wildlife Service, Columbia Ecological Services Field Office, 608 East Cherry, Columbia, MO 65201
Forest Supervisor, Ouachita National Forest, Hot Springs, AR Attn: Jerry Davis

SLH:INDBTRAN.SC7

**DRAFT**

October 28, 1998

2-14-98-I-82

Ms. Gloria Manning

Acting Regional Forester

U.S. Forest Service

Southern Region

1720 Peachtree Road, NW

Atlanta, Georgia 30367

Re: Formal Consultation under Section 7 of the Endangered Species Act for the Effects of Management Activities Conducted by Ouachita National Forest on the Indiana Bat

Dear Ms. Manning:

The U.S. Fish and Wildlife Service (Service) has reviewed the programmatic biological assessment for the continued implementation of forest-wide management activities on the Ouachita National Forest in southwest Arkansas and southeast Oklahoma. The Regional Forester's request for formal consultation dated October 23, 1997 was received on October 30, 1997 and accompanied the biological evaluation. This document represents the Service's biological opinion on the effects of those actions on the federally endangered Indiana bat (*Myotis sodalis*) in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, amended (16 U.S.C. 1531 et seq.).

This biological opinion is based on information provided in the programmatic biological evaluation that analyzed the effects of ongoing management activities on the Ouachita National Forest and the Amended Land and Resource Management Plan (ALRMP)(U.S. Forest Service 1990) for the Ouachita National Forest, joint Service and Forest Service meetings, telephone conversations, and other sources of information. A complete administrative record of this consultation is on file in the Oklahoma Ecological Services Field Office, 222 South Houston, Suite A, Tulsa, Oklahoma 74127; Telephone (918) 581-7458; fax (918) 581-7467.

The Service concurs with your biological assessment that the existing ALRMP provides broad goals, objectives, standards, and guidelines with respect to meeting the needs of the Indiana bat. In addition, we understand that a Notice of Intent for revising the Ouachita National Forest ALRMP will be issued in 1998 and the final Ouachita National Forest Land and Resource Management Plan (LRMP) is scheduled to be completed by March 2001. We encourage and support your efforts to develop revised standards and guidelines to meet the needs of the Indiana bat as well as other endangered and threatened species. This Section 7 consultation focuses only on the potential effects to the Indiana bat of the proposed action which consists of continued forest management activities in accordance with the existing Ouachita National Forest ALRMP.

## CONSULTATION HISTORY

Discussion between the Ouachita National Forest and Services were initiated during the summer of 1997 regarding Ouachita National Forest initiating a programmatic consultation with regard to its forest management activities and other actions that alter forest habitats. The Forest Service requested formal consultation under Section 7 of the ESA on October 23, 1997 and a programmatic biological assessment

for Service review was provided on this date. In a letter dated December 3, 1997, the Service concurred with the Forest Service's request for formal consultation concerning the potential impacts of continued forest management practices on the Ouachita National Forest.

## DESCRIPTION OF PROPOSED ACTIONS

As defined in 50 CFR 402.02, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas. The "action area" is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, state, or private activities, as well as cumulative effects of reasonably certain future state or private activities within the action area. The action area for this project includes the entire 1,763,774 acres of Ouachita National Forest lands in Arkansas and Oklahoma.

### *Proposed Actions*

This biological opinion addresses a variety of management directions and associated activities that are planned, funded, executed, or permitted by the Ouachita National Forest. These activities are implemented in accordance with the provisions contained in the ALRMP. The ALRMP is a general programmatic planning document that provides management goals, objectives, standards, and guidelines under which project level activities (e.g., timber sales, wildlife habitat management, road construction, special use, etc.) may be planned and implemented to carry out the management direction of the Ouachita National Forest. Land use allocations are made and outputs projected based upon the

direction established in the ALRMP. All project level activities undergo National Environmental Policy Act (NEPA) review by appropriate Forest Service personnel when proposed, in addition to assessment of project effects to federally-listed species in compliance with Section 7 of the ESA. The ALRMP establishes multiple use management area prescriptions (including associated standards and guidelines) for future decision making which are adjustable (via monitoring and evaluation) through amendment and revision.

Specific proposed activities that are being considered in this consultation include timber sales, road construction/reconstruction, pond construction, herbicide application, and prescribed fire. Other activities that may require minor timber removal include management of recreation areas, hazard tree removal, maintenance and clearing of small openings, range management, and wildlife management activities. Land exchanges are another Forest Service activity that may effect Indiana bats and their habitat. However, as any potential land exchange would require an individual biological evaluation, this activity is not considered in this consultation.

Timber sales are the primary management activities that alter and/or disturb the greatest amount of forest habitat on the Ouachita National Forest. Sales are offered through competitive bids to achieve various objectives, including commodity production and stand regeneration for wildlife habitat improvement. The Ouachita National Forest does not have a commercial hardwood timber sale program. Timber management and harvest activities do not include clear cuts, but will be done though seedtree and shelterwood cuts, thinning, salvage and firewood sales, and single tree and group selection. Road construction and reconstruction could potentially remove some roost trees and eliminate water holes in road ruts. Over the past six years, road construction has averaged 27 miles per year and road reconstruction has averaged 37 miles per year. Some snags important to wildlife can be lost to

prescribed burning, at the same time fire creates new snags. A principal concern with the effect of fire on Indiana bats is in where smoke can sink into hibernacula and interrupt hibernation. Management activities are summarized in Table 1.

*Existing Standards and Guidelines that Provide Protection of Indiana Bat*

When the ALRMP was written, the federally-listed endangered Indiana bat was not known to occur on the Ouachita National Forest, but the plan indicated that the Indiana bat may occur on the Forest. The Indiana bat was found on the Ouachita National Forest in 1989 and documented by Saugey et al. (1990). Although not specifically written for the Indiana bat, the ALRMP direction incorporates management practices in its standards and guidelines that will provide a significant level of protection for Indiana bat habitat. These existing standards and guidelines provide a number of secure summer and fall foraging areas, and a steady supply of potential roost trees across the Ouachita National Forest. In addition, protection is afforded to the known Indiana bat hibernaculum through cave protection standards. These standards and guidelines were developed with the best information available at the time the forest plans were completed.

Prior research had documented the value of protecting important cave sites along with what was then believed to be adequate buffers along forested riparian foraging habitat used by Indiana bats. At that time riparian habitat was thought to be the primary foraging habitat for Indiana bats both prior to their entry into hibernation in the fall and following their emergence from hibernation in the spring. Management measures implemented by the ALRMP are based on current information available relative to this species and its habitat requirements. This information is important to consider when carrying out vegetation management objectives and other planned project activities on the Ouachita National Forest.

**Table 1. Management Activities**

Timber Management

| Activity | Units | ALRMP* Annual Projection | FY 1996 |
|---|---|---|---|
| Clearcut | acres | 0 | 0 |
| Seedtree | acres | 2,760 | 756 |
| Removal | acres | ** | 107 |
| Shelterwood | acres | 3,485 | 1,057 |
| Uneven-aged | acres | 23,562 | 9,033 |
| Thinning | acres | 21,313 | 12,474 |
| Salvage | acres | ** | 1,512 |
| Timber Harvest | MMCF*** | (30) | 29 |
| Fuelwood Sold | cords | ** | 566 |
| Timber Stand Improvement | acres | 22,980 | 4,999 |

Wildlife Habitat Management

| Activity | Units | ALRMP Annual Projection | FY 1996 |
|---|---|---|---|
| Prescribed Burning | acres | 24,000 | 20,969 |
| Midstory Reduction | acres | 1,350 | 2,286 |
| Overstory Development | acres | 1,500 | 1,004 |
| Seeding & Planting | acres | 550 | 134 |
| Opening Construction | acres | 35 | 32 |
| Opening Maintenance | acres | 14 | 0 |
| Waterhole Development | structure | 220 | 113 |
| Prescribed Burning Other | acres | 12,000 | 27,783 |

Road Construction and Reconstruction

| Fiscal Year | Activity | |
|---|---|---|
| | Construction Miles | Reconstruction Miles |
| 1997 (projected) | 20.6 | 42.3 |
| 1996 | 13.4 | 40.2 |
| 1995 | 22.5 | 20.0 |
| 1994 | 37.1 | 25.0 |
| 1993 | 30.7 | 40.3 |
| 1992 | 38.7 | 51.8 |

* Amended Land and Resource Management Plan
** Annual projections are not set in the ALRMP.
*** Million cubic feet

It is important to maintain an adequate supply of snags, live roost trees, live potential roost trees, upland water sources, and other habitat features to assure the continuing existence and promote the recovery of Indiana bat population. An effort also is made to accomplish forest generation to provide diverse insect production, provide bat foraging access, improve characteristics of roost trees, and maintain the existing forest types occurring on the Ouachita National Forest.

The purpose of the program is the conservation, enhancement, and management of summer pre-hibernation and post-hibernation roosting habitat and foraging habitat, upland drinking water sources, and winter hibernacula management. The Ouachita National Forest ALRMP also includes monitoring of certain habitat features, such as snag retention in timber sale areas, and monitoring of wildlife species.

Management measures included in the existing standards and guidelines in the ALRMP that are most applicable to the management, conservation, and recovery of the Indiana bat are as follows:

1. Wildlife Management Goals and Objectives

   Maintain viable populations of all existing native plants and animals in the planning area.

   Protect and improve habitat for threatened, endangered and sensitive species of plants and animals.

Provide for diversity of plant and animal communities throughout the planning area.

Manage for a full range of nongame species through habitat improvements, population maintenance and sensitive habitat protection.

Improve habitat for game and nongame species.

2. Wildlife Resource Activities

Provide for early serial stage habitats through harvest cuts and other opening creating improvements.

Strive to maintain a minimum of six percent of the suitable acres on a compartment basis in grass-forb or shrub-seedling habitats (include regeneration area 0-10 years, areas of storm or insect damage, closed roads, temporary and permanent openings and utility rights-of-way).

Provide for and designate areas for mast production at the approximate rate of 20 percent on a per compartment basis. Hardwood and hardwood - pine forest types, age 50 and older, comprise the component.

Retain den tree clumps of deciduous trees at a rate of one-half acre per 20 acres of even-aged regeneration cutting. Where possible, locate clumps around existing den trees. Large den trees (18" dbh or greater) will be retained wherever they occur.

Identify project level Management Indicator Species (MIS) during the scoping process, perform habitat inventories and determine distribution within the project area based on scientific literature, consultation with state and federal agencies, and knowledgeable individuals and incorporate this information into project level analysis (biological evaluations) during the silvicultural prescription process and other proposed resource management activities.

Retain at least two snags per acre, minimum 12" dbh with an objective of 16" dbh or larger, in regeneration areas. Where naturally occurring snags of this size are unavailable or cannot be created, retain or create snags as near as possible to the required size. Snags may be created at greater densities, if needed, to benefit snag dependent wildlife species. Retain existing snags during intermediate treatment (thinnings) and wildlife habitat improvement activities.

Retain or develop mature growth pine habitats (80 years old or greater) and mature growth hardwood habitats (100 years old or greater) within each compartment at a rate of five percent each. These elements may be provided on lands unsuitable or suitable for timber management.

Where open area habitats are not provided by other conditions, develop one permanent wildlife opening, one to five ares per 160 of habitat.

Provide at least one permanent water source (wildlife pond/developed spring) per 160 acres or at greater densities if needed to accomplish wildlife objectives.

3. Threatened, Endangered, and Sensitive Species (TES)

Prepare a biological evaluation on all projects to determine possible effects on threatened or endangered species, or on species proposed for such listing, or on sensitive species.

Assess the adequacy of existing inventories to allow biological evaluations.

Undertake inventory work needed to fill data gaps on the distribution of threatened and endangered species, those proposed for such listing, or sensitive species.

Preserve threatened, endangered, and sensitive plants and animal species habitat and natural plant communities.

Under burns are not done in commercial pine-hardwood stands and inclusions until hardwood crop trees reach 5-6 inches in diameter at ground level. Only low intensity, or dormant season fires with flame lengths of two feet or less are allowed.

4. General Forest Area

During release, pre-commercial thinnings, and commercial thinnings, retain the desired hardwood component in hard mast producing species.

Emphasize hickories and a variety of oak species to help ensure greater consistency of nut and acorn production. No single species of oak can be relied upon to produce acorns year after year.

In pine management types, where possible, maintain a minimum of 10 percent hardwood and strive to achieve 20 percent, with a maximum not to exceed 30 percent. Maintain this composition through the life of the stand. Base percent of hardwood component on wildlife and other resources coordination objectives. Species of hardwood to be maintained will be determined by wildlife habitat and visual needs.

Riparian ecosystems that encompass floodplains and wetlands will receive appropriate protection. As a minimum, riparian areas will extend 100 feet from the edge of all perennial streams and other perennial water bodies, including lakes.

5. Specific to the ALRMP goals, objectives, standards and guidelines are actions being taken to consider and meet the needs of bats.

Caves, cave-like features, and mines which harbor or have the potential as bat habitat, are managed by protecting the cave systems, entrances, and other associated features from alteration or closure. Activities in the vicinity of caves which might alter the winter cave microclimate to the detriment of the bats are avoided.

Necessary steps are taken to protect hibernacula. Included are such actions as constructing and locking cave gates and installing warning/interpretive signs within the entrance of those caves

and mines that have the potential of human disturbance in an effort to protect sensitive winter bat colonies.

For ALRMP and TES compliance, monitoring of the Indiana bat hibernaculum is an annual winter survey. Regular monitoring is done by inspecting cave gates and signs at various times during the year. Conducting annual winter population censuses in the hibernaculum, and evaluating the frequency and degree of human disturbance at the hibernaculum are part of the monitoring process. Visual sightings, mist nets, and harp traps are used to census other areas in both winter and summer to determine bat distribution and species composition.

6. Specific Indiana bat monitoring actions include: Cave monitoring and winter hibernaculum censuses; monitoring, maintenance, and repair of cave gates, signs, closures, and other structures designed to reduce human disturbance levels at the hibernaculum; and monitoring of human disturbance factors at the hibernaculum.

## RANGE WIDE STATUS OF THE SPECIES

### *Species Description*

The Indiana bat is a medium sized, monotypic species (there are no subspecies) of the genus *Myotis* that is known to occur in much of the eastern half of the United States. Head and body length of individuals range from 41 to 49 millimeters (mm) (1 5/8 - 1 7/8"), and forearm length of 35 to 41 mm (1 3/8 - 1/5/8") (USFWS 1983). This species is similar in appearance to both the little brown bat (*M. lucifugus*) and the northern long-eared bat (*M. septentrionalis*). The Indiana bat often has a distinctly

keeled calcar. The hind feet tend to be small and delicate with fewer, shorter hairs (i.e., do not extend beyond the toenails) than its congeners. The fur lacks luster (Barbour and Davis 1969, Hall 1981). The ears and wing membranes have a dull appearance and flat coloration that do not contrast with the fur. The fur of the chest and belly is lighter than the flat (not glossy), pinkish-brown fur on the back, but does not contrast as strongly as does that of the little brown or northern log-eared bat. The skull has a small sagittal crest, and the braincase tends to be smaller, lower, and narrower than that of the little brown bat (Barbour and Davis 1969, Hall 1981).

The species was listed as endangered by the Service pursuant to the Endangered Species Preservation Act on March 11, 1967. The following sites have been designated as critical habitat for the Indiana bat: Bat Cave in Carter County , Kentucky; Coal Cave in Edmonson County, Kentucky; White Oak Blowhole Cave in Blount County, Tennessee; the Blackball Mine in LaSalle County, Illinois; Big Wyandotte Cave in Crawford County, Indiana; Ray's Cave in Greene County, Indiana; Cave 021 in Crawford County, Missouri; Cave 009 in Franklin County, Missouri; Cave 017 in Franklin County, Missouri; Pilot Knob Mine in Iron County, Missouri; Bat Cave in Shannon County, Missouri; Cave 029 in Washington County, Missouri; and Hellhole Cave in Pendleton County, West Virginia.

***Life History***

According to the known and suspected range of the Indiana bat presented in the species' recovery plan (USFWS 1983), the Indiana bat is a migratory species that ranges over an area of approximately 580,550 square miles in the eastern half of the United States. Hibernating populations are known to exist in Indiana, Kentucky, Missouri, Alabama, Arkansas, Connecticut, Florida, Georgia, Illinois, Iowa, Maryland, Massachusetts, Michigan, Mississippi, New Jersey, New York, North Carolina, Ohio,

Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin (USFWS 1983). More than 85 percent of the range wide population of the Indiana bat is known to occupy nine "Priority One" hibernacula (i.e., hibernation sites with a recorded population > 30,000 bats since 1960). Three Priority One hibernacula occur in each of the states: Indiana, Kentucky, and Missouri.

"Priority Two" hibernacula (recorded population > 500 but < 30,000 bats since 1960) are known to occur in Indiana, Kentucky, and Missouri as well as Arkansas, Illinois, New York, Ohio, Tennessee, Virginia, and West Virginia. "Priority Three" hibernacula (recorded populations of < 500 bats or single hibernating individuals) have been reported in the above states and also include Alabama, Connecticut, Florida, Georgia, Iowa, Maryland, Massachusetts, Michigan, Mississippi, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Vermont, and Wisconsin.

Indiana bats hibernate in caves and mines that provide specific climatic conditions, preferring hibernacula with stable winter temperatures below 10 degrees Celsius (optimal temperature is 4-8 degrees Celsius) and relative humidities above 74 percent (USFWS 1997). Stable low temperatures allow the bats to maintain a low rate of metabolism and conserve fat reserves through the winter until spring (Humphrey 1978, Richter et al. 1993). Because few caves or mine shafts provide these exacting conditions, more than 85 percent of the species hibernates in only nine caves or abandoned mine shafts (USFWS 1996). Indiana bats undergo swarming prior to hibernation, an activity which entails bats congregating around the hibernacula, flying into and out of the cave, and roosting in trees outside (Kiser et al. 1996). Swarming continues for several weeks, during which time the bats mate and replenish fat reserves prior to hibernation. Depending on local weather conditions, swarming way continue through October or November. Males Generally remain active longer than the females during this pre-hibernation period, but all Indiana bats are usually hibernating by late November (USFWS

1983). Indiana bats typically hibernate in dense clusters, with bats densities ranging in size from 300 to approximately 500 per square foot (Clawson et al. 1980). Indiana bats select roosts within hibernacula that best meet their needs for cool temperatures; in many hibernacula, these roosting sites are near an entrance, but may be deeper in the cave or mine if that is where the cold air flows and is trapped (Tuttle and Stevenson 1978). Females emerge from hibernation first (generally in late March or early April). Although most hibernating colonies leave the hibernacula by late April, some males may spend the summer in the vicinity of the hibernaculum. Those leaving the hibernaculum migrate varying distance to their summer habitats.

During the summer months, Indiana bats typically roost during the day beneath loose or exfoliating bark in snags or living trees. To a limited extent, tree cavities or hollow portions of tree boles and limbs also provide satiable roost sites (Gardner et al. 1991a, Kurta et al. 1993b). In addition, some adult males have been found roosting by day in some caves that are also used as winter hibernacula.

Females store sperm through the winter and become pregnant via delayed fertilization soon after emergence from the hibernacula. They then form small maternity colonies under loose bark or in cavities of snags or mature live trees in riparian or upland forests. Each female gives birth to a single young in late June or early July and the young become volent in approximately one month. By late August, the maternity colonies begin to disperse. Indiana bat maternity sites generally consist of one to several primary maternity roost trees (i.e., trees used repeatedly by relatively high numbers of bats in the maternity colony during the maternity season) and varying number of alternate roost trees (i.e., those tree used by smaller number of bats throughout the course of the maternity season). Primary roost trees that have been studied to date have ranged in size from 12.2 to 29.9" dbh (Romme et al. 1995). Studies have shown that adults in maternity colonies may use a few as two, to as many as 33,

alternate roosts (Humphrey et al. 1977, Gardner et al. 1991a, Garner and Gardner 1992, Callahan 1993, Kurta et al. 193, Romme et al. 1995, Kurta et al 1996). Alternate roost trees also tend to be large, mature trees, but the range in size is somewhat wider than that of primary roosts (7.1 to 32.7" dbh) (Romme 1995). In Missouri maximum distances between roost trees used by bats from the same maternity colony have ranged from 1.0 to 1.9 miles (Callahan 1993). Snags (i.e., dead trees) exposed to direct solar radiation were found to be used most frequently by Indiana bats as summer roosts, followed by snags not fully exposed to solar radiation and live trees not fully exposed (Callahan 1993).

Until recently, most documented Indiana bat maternity colonies were located in riparian or floodplain forest (Humphrey et al. 1977). However, recent studies and survey results indicate that upland forest provide maternity habitat for Indiana bats (Gardner et al. 1990 and Romme et al. 1995). In addition, females are known to exhibit relatively strong loyalty to summer roosting and foraging habitat (Bowles 1981, Gardner et al. 1991a, 1991b).

Indiana bats are known to occupy distinct home ranges during the summer (Gardner et al. 1990). Average home range sizes vary from approximately 70 acres (juvenile males) to over 525 acres (post-lactating adult females). Roosts occupied by individuals ranged from.33 miles to over 1.6 miles from preferred foraging habitat, but are generally within 1.2 miles of water (e.g., stream, lake, pond, natural or manmade water-filled depression). A more detailed description of the life history of the Indiana bat is provided in the Indiana Bat Recovery Plan (USFWS 1983) and the Preliminary Agency Draft Indiana Bat Recovery Plan (1997).

A habitat suitability index model was recently developed for the Indiana bat (Romme et al. 1995) which identifies nine variables that comprise the components of summer habitat for the species. The

model was developed for use in southern Indiana, a core area of the Indiana bat population Therefore, caution must be applied to peripheral areas within the species range, such as Arkansas and Oklahoma and the Ouachita National Forest. Five variables considered important for roosting habitat within analysis areas included: amount of overstory canopy, diameter of overstory trees, density of potential live roost trees, density of snags, and the mount of overstory cover. Variables considered to be important foraging habitat components included the amount of overstory canopy and the percent of tree in the 2 to 2.7" dbh class. Distance to water, and percentage of the analysis area with forest cover were also considered to be important habitat variables. Habitat with distance to water of 0 to 0.93 miles and percent of forested land $\geq$ 30 percent received high use.

The habitat model classified species of trees that provide roosts for Indiana bats: Class I trees include:

| | | |
|---|---|---|
| Silver maple | Shagbark hickory | Shellbark hickory |
| Bitternut hickory | Green ash | White ash |
| Eastern cottonwood | Red oak | Post oak |
| White oak | Slippery elm | American elm |

These species are likely to develop the loose, exfoliating bark as they age and die that is preferred by Indiana bats for roosting sites. These species are typical of bottomland hardwood forests in areas where much of Romme's research was done. Romme also identified Class II trees, which include sugar maple, shingle oak, and sassafras as tree species believed to be of somewhat lesser value for roosting Indiana bats. Class III trees are all other species not included in the other two classes. Class II and III trees are species that are less likely to provide optimal roosting habitat, but may develop suitable cracks, crevices, or loose bark after death.

Preferred roost sites are in trees that are 9 inches or larger in dbh and are located in forested habitat where the degree of overstory canopy cover ranges from 60-80 percent. In general, the largest available trees with suitable bark characteristics and at least some daily exposure to sunlight are the most likely to be used by Indiana bats as maternity roosts. The suitability of a given area as roosting habitat declines slightly as canopy closure increases from 80-100 percent, and also declines as canopy closure falls below 60 percent (Romme et al. 1995).

Indiana bats prefer to forage within the upper canopy layers of forest where the degree of overstory canopy cover ranges from 50-70 percent (Romme et al. 1995). Foraging also takes place over clearing with early successional vegetation, along the forested borders of agricultural land, and along strips of trees extending into more open habitats.

Drinking water is essential when bats actively forage. Throughout most of the summer range, Indiana bats frequently forage along riparian corridors and obtain water from streams. However, natural and man-made ponds and water-filled road ruts in the forest uplands are also very important water sources for Indiana bats in those regions.

***Status of the Species Within its Range***

Based on censuses taken at hibernacula, the total known Indiana bat population is estimated to be approximately 352,000 bats. However, many hibernacula populations have been decreasing in numbers since monitoring efforts were initiated. The most serious declines have occurred in two of the three historically highest populated states for Indiana bats, namely Kentucky and Missouri. Kentucky numbers declined by an estimated 145,000 bats between 1960-1975. Losses were attributed to exclusion

and changes in the microclimate of two of the three most important hibernation sites in the state. More specifically, poorly designed cave gates (Humphrey 1978) and construction of buildings over the upper entrance to one of the hibernacula appeared to have caused great declines. Many of the most important remaining hibernating populations (west-central, northeastern, and extreme southeastern Kentucky) have continued to decline steadily in the last 15 years. The populations in north-central Kentucky appear to be remaining stable while western Kentucky numbers have increased.

The colonies of Indiana bats in all of the 16 known Priority One and Two hibernacula in Missouri have declined since 1980. Since 1983, despite efforts such as cave gating, the overall Missouri population has steadily and drastically declined by 250,000 bats. This loss represents more than 80 percent of the Missouri population (USFWS 1997).

*Status of the Species in Arkansas and Oklahoma*

Although known Indiana bat numbers appeared to have dropped from the earliest known surveys through 1980, the population has been steadily growing in recent years. In states with documented records of Indiana bat winter occurrence, there are limited population trend data. Populations in New York, Pennsylvania, and West Virginia appear to be increasing but the population in Arkansas is apparently declining. The Arkansas hibernating population declined by about 66 percent from 1983-1996, from about 6,000 to about 2,060. The 1996 estimate was 480 less than the winter 1994-95 count. During the winter of 1980-81, the population of the largest colony, located in Edgemon Cave on Buffalo National River lands, numbered about 5,000. In 1996, the number dropped to about 1,180. Thus the population in Edgemon Cave decreased by over 76 percent in 15 years.

Currently the Ouachita National Forest is only known to have one occupied hibernaculum, but it is assumed that Indiana bats use the Ouachita National Forest during the spring to fall period as well. Saugey et al. (1990) reported finding seven hibernating Indiana bats in Bear Den Cave, LeFlore County, Oklahoma in the Choctaw Ranger District. These one male and six females Indiana bats were found on January 16, 1989, in an area approximately 5 meters. wide and 12 meters. Since the discovery, annual cave surveys have been conducted and one to nine Indiana bats have been found per year. In addition to these surveys, other caves and mines on the Ouachita National Forest have been surveyed several times each winter. In more than 100 surveys of the other caves and mines since 1982 no additional Indiana bats have been found. The Ouachita National Forest is on the extreme western edge of the Indiana bat's range, so the number of Indiana bats using the Forest is probably relative low.

The Bear Den Cave hibernaculum is a lobe of a syncline feature that provides a small entrance hole and vertical shaft. It is located in Forest Management Area 19 that includes 121,124 acres with management emphasis in support of recreational and wildlife objectives and suitable and unsuitable areas for timber production. However, the suitable areas are not managed for timber production, but timber management activities can be done to support recreational and wildlife objectives compatible with the National Recreation Area and the special designations. Contiguous areas included in the special designation are: Winding Stairs Mountain National Recreation Area, Rich Mountain Recreation Area, Robert Kerr Memorial Arboretum, Rich Mountain Botanical Area, Beech Creek Botanical Area, Beech Creek Scenic Area, Indian Nation's Scenic Area, Black Fork Mountain Wilderness, and Upper Kiamichi River Wilderness.

No Indiana bat maternity colonies have been found on the Ouachita National Forest. Twenty harp trap nights have been conducted inside the entrances of abandoned mines and 224 net nights have been

conducted throughout the Ouachita National Forest since 1982 to monitor all bat species. No other Indiana bats or locations have been found on the Ouachita National Forest and Saugey believes that most mines on the Ouachita National Forest are too warm to serve as Indiana bat hibernacula. Other surveys of Leflore and McCurtain Counties in Oklahoma were conducted by Dr's Brenda and Bryon Clark of Southeastern Oklahoma State University, in June, July, and August of 1994, 1995, and 1997. One hundred thirty five net nights were conducted with 16 net nights in the vicinity of Bear Den Cave. Eight bat species and over 500 individuals were caught but none were Indiana bats.

*Threats to the Species*

A number of identified factors have likely contributed to the decline of the Indiana bat throughout its range, with the most significant being human disturbance of hibernating bats and vandalism. Human entry into a hibernaculum during the winter causes the bats to awaken. Each time a bat awakens, it uses some of the fat reserves it has accumulated for the winter. Frequent disturbance may cause the bats to use up all of their stored fat reserves, forcing them to leave the cave too early in the year to search for food, likely resulting in starvation. Vandalism is also a serious problem that has resulted in deliberate destruction of many bat colonies simply because these animals are often viewed by the public as nuisances or threats to human health.

Other possible causes of decline of Indiana bat populations include natural disasters, alteration of habitat (summer maternity and winter hibernacula), and chemical poisoning. Caves occupied by Indiana bats (and other bat species) occasionally flood or collapse, killing a few, to thousands of bats. Timber harvest, water quality degradation, stream channelization, and other actions can, in some cases, result in destruction or alteration of actual or potential roosting and/or foraging habitat. However, it should

be noted that the location of suitable Indiana bat roost trees across the landscape changes over time as various trees develop or lose bark, or as the trees die and fall. In addition, Indiana bats frequently change roost trees as particular trees become unsuitable and other become suitable as roosts. It is not currently known how long or how far female Indiana bats will search to find new roosting habitat if traditional habitats have been destroyed or rendered unsuitable. If they are required to search for prolonged periods of time after emerging from hibernation in the spring, this effort may place additional stress on the females at a time when they are already expending significant amounts of energy.

The impact of herbicide use on Indiana bats has not been studied, but insecticides are thought to have contributed to the decline of other insectivorous species of bats (Clark 1981). Insecticides, particularly those used for forest pests, could have both direct impacts (a bat eating a contaminated insect) or indirect effects (loss of the species forage base since most insecticides are typically species specific). It is possible that herbicide use (e.g., aerial application) could have indirect impacts on the Indiana bat by potentially reducing vegetation, and consequently the insect population numbers or diversity, in the treatment area. However, this potential indirect effect would not be anticipated to be significant with irregular use of herbicides. In addition, the exposure of bats to open oil pits in some states has resulted in direct mortality of individuals (many unable to be identified by species).

Historical collecting, counting, handling, and banding by biologists are also thought to have contributed to declines in Indiana bat population numbers. During the winter, these activities cause hibernating bats to awaken and use stored fat reserves; during the summer they may disturb sensitive maternity colonies. For this reason, winter counts are now conducted on a biennial basis at some caves. Banding of bats collected by mist netting during the maternity season, however, is thought to have a negligible

effect on bats.

Poorly designed and installed cave gates restrict bat movement and alter air flow into caves. Air flow alternations may change the climatic conditions and render the cave unsuitable for hibernation. Commercialization of caves results in disturbance to summer or hibernating bat colonies, and impoundment of streams result in permanent or unseasonal flooding of caves (USFWS 1983).

*Recovery Goals and Accomplishments*

Recovery for the Indiana bat will depend to a large extent on maintaining the ecological integrity of essential hibernacula and protecting them from human disturbance (USFWS 1983). In addition, foraging habitat (including riparian forest vegetation and dead trees) must be maintained, protected, and restored. Lastly, in order to evaluate the success of protection efforts, a monitoring program needs to be established to document changes in Indiana bat populations.

Delisting will be considered when (USFWS 1983):

1. Stable or increasing populations for three consecutive census periods are documented and permanent protection for seven priority one caves is provided and
2. Protection and documentation of increasing or stable populations occurs for three consecutive census periods at 50 percent of the priority two caves in each state.

More specifically, the recovery outline entails the following:

1. Prevent disturbance to important hibernacula by:

   (a) Preventing entry;

   (b) Preventing adverse modifications to winter and fall roost sites;

2. Maintain, protect, and restore foraging and nursery roosts by preventing adverse modification to foraging areas and nursery roost habitat.

3. Monitor population trends.

4. Public education.

5. Research needs.

Thirteen caves and mines have been designated as critical habitat for the Indiana bat (found within Illinois, Indiana, Kentucky, Missouri, Tennessee, and West Virginia). In general, priority levels for protection of hibernacula have been based on recorded populations of the Indiana bat within each hibernacula. Since the priority designation, an active set of programs at the state and federal levels have led to the acquisition and protection of a number of Indiana bat hibernation caves. Of 127 caves/mines with populations > 100 bats, 54 (43 percent) are in public ownership or control. In addition, approximately 46 (36 percent) hibernacula (most on public land) are gated or fenced (USFWS 1997).

Additional recovery criteria are currently being considered and a revised Indiana Bat Recovery Plan is currently under review.

## ENVIRONMENTAL BASELINE

The Ouachita National Forest consists of 1,763,774 acres south of the Ozark Plateau in the Ouachita Mountains, in west-central Arkansas and southeastern Oklahoma. The forest has 929,147 acres classified as pine, mainly shortleaf pine, 185,838 acres of pine/hardwood, 135,361 acres of hardwood/pine, and 354,102 acres of hardwood. Of this 1,604,448 acres of forest, 994,455 acres are suitable for timber production. Due to the geology of the region, with the lack of sedimentary limestone, there are no solutional caves. Bear Den Cave, located on Winding Stair Mountain, in southeastern Oklahoma, occurs in an out crop belt of a massive sandstone unit and was formed by gravitational sliding and slumpage of sandstone. This cave has more than 1200 feet of passageway and represent the only known cave from the Ouachita National Forest (Puckette 1974-75).

Caves formed similar to Bear Den Cave are known as talus caves. Talus caves are formed by large rocks falling, rolling, sliding, or tilting against one another in a way that leaves a cavernous space between or under the rocks. Most are rock shelters rather than caves, but a few are extensive enough to provide total darkness. Talus caves do provide important shelters for animals and plants seeking the comparatively uniform cave climate (Halliday 1982).

Additional subterranean habitat was formed in the late 1800's, when the area was mined for gold, lead, silver, zinc, manganese, and mercury. There are 27 known abandoned mines on the Ouachita National Forest. (Saugey et al 1988) Where caves are scarce, abandoned mine shafts occasionally provide the

same specialized habitat as do natural caves.

Caves are threatened by surface development that damages forest and soil cover and overrun by residential, commercial, and industrial sprawl. The water that flows through them and supports cave life is being contaminated. Caves are damaged by careless recreational activity and by human intrusion. Cave forms and speleothems represent thousands or even millions of years of geological development and are nonrenewable and irreplaceable (Weaver 1992).

The Federal Cave Resource Protection Act (Public Law 100-691 - Nov. 18, 1988, 102 STAT 4546-4551 100th Congress.) states that significant caves (43 CFR Subtitle A (10-1-95) Part 37 - Cave Management) on federal land are an invaluable and irreplaceable part of the nations's natural heritage and in some instances, these significant caves are threatened due to improper use, increased recreational demand, urban spread, and a lack of specific statutory protection. The purpose of the Act is to secure and preserve significant caves on federal lands for the perpetual use, enjoyment, and benefit of all people. Furthermore, this Act fosters increased cooperation and exchange of information between government authorities and those who use caves located on federal lands for scientific, education, or recreational purposes.

Bat fauna represent an integral component of the Ouachita National Forest ecosystem. Bats, particularly those inhabiting caves and mines, represent an extremely vulnerable faunal element (Saugey et al., 1988) Clearly, marginal habitats of importance to bats such as caves and abandoned mines, along with diverse and spatially distributed forest types and age classes, appear to have contributed to the rich bat fauna of the region. Protection, maintenance, and enhancement of the habitat components must be considered in all phases of planning and implementation of management activities. Recent

investigations of habitat utilization by Indiana bats in Illinois (Gardner et al. 1991a) revealed use of living red oak, white oak, post oak, and hickory trees as roost trees, and use of shagbark hickory snag as a maternity site; all of which occur in the Ouachita National Forest.

*Effect of the Action*

Direct Effects

Direct impacts to the Indiana bat could occur as the Ouachita National Forest continues to implement its forest wide management activities. Impacts to the Indiana bat may result in direct mortality or injury to individuals or small groups of roosting bats when trees are cut that harbor undetected roosts or the accidental felling of occupied snags, shagbark hickories, or damaged or hollow trees during timber harvest or site preparation.

The likelihood of cutting a tree containing a maternity colony or individual roosting Indiana bat is anticipated to be extremely low. This is due to the large number of suitable roost trees present on the Ouachita National Forest, the rarity of the species, the wide dispersal of Indiana bats and maternity colonies throughout the species's range, and the fact that there have been no maternity colonies found in Oklahoma or Arkansas on the Ouachita National Forest or on other public or private lands in these two states. Other direct effects could result if large tracts of hardwood and hardwood/pine habitat are harvested, forcing the bats in a roosting or maternity colony to abandon a traditionally used site, if there are such sites in Oklahoma and Arkansas. This could lower reproductive success due to forced abandonment of lactating females.

The Ouachita National Forest does not have a commercial hardwood timber sale program, therefore, most of the hardwood component valuable to Indiana bats will be retained. The cutting of pine trees greater than 9" dbh and opening up of the canopy in sale areas and through wildlife stand improvements could increase exposure to solar radiation of some potential roost trees. However, cutting mature shortleaf pines having scaly bark could reduce roost sites but could release favorable hardwood species to produce new roost trees.

Implementation of the Ouachita National Forest standards and guidelines minimize direct adverse effects of timber harvest and other activities to the Indiana bat and assist in maintaining suitable roosting and foraging habitat. The Ouachita National Forest maintains an undisturbed 200 foot buffer around all known cave entrances. This should help protect suitable roost trees used by Indiana bats that swam and forage near hibernacula in late summer and autumn.

Direct effects to hibernating Indiana bat could result from human activity (disturbance and vandalism) in caves during the winter. Disturbance may cause the bat's fat reserve to become exhausted prior to spring, increasing the potential for mortality. In addition, mortality from humans killing Indiana bats in caves has been documented (Mohr 1972). However, the potential for Indiana bats to be disturbed during hibernation on the Ouachita National Forest has been greatly reduced with construction of the gate to protect Bear Den Cave.

Prescribed burning during the summer season could result in direct mortality of Indiana bats due to the actual roost tree being incinerated or death caused by smoke inhalation. Because the majority of burns will occur during the winter or early spring when most bats are hibernating, direct mortality due to the loss of roost trees will be minimized. However, smoke can sink into the hibernaculum and

interrupt hibernation. This is not expected to be a problem at the Bear Den Cave hibernaculum because it is located about 2,000 feet in elevation, its entrance is surrounded by sparse fuels and it is not in a cove or sink location that would facilitate it filling with smoke. Further, as existing dense overstory and understory vegetation inhibits free bat movement and foraging, prescribed burning will restore and maintain uncluttered open foraging pathways for the bats and allow easier access to roost trees. Increased insect populations produced in burned areas is also likely to occur in successional years.

Clearing areas for road construction, pond construction and recreational development may also result in alteration of roosting and/or feeding activities by the bats. Over the past six years, road construction has averaged 27 miles per year and road reconstruction has averaged 37 miles per year. Road construction reduces an average of 65 acres of potential habitat per year across the 1.76 million acre Ouachita National Forest. Roads provide openings in the canopy for use by Indiana bats and pond construction could increase the number of upland water sources available on the Ouachita National Forest.

**Indirect Effects**

Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). Removal of living trees or snags which have the potential to serve as roosts for maternity colonies or individual bats, reduction in the density of mature trees could result in the loss or alternation of summer (roosting and foraging) and prehibernation (fall foraging) habitat. In addition, timber harvest could alter insect species composition and reduce the availability of certain insects causing the bats to search for alternate foraging habitat.

Indirect effects to the Indiana bat from herbicides are considered minimal since they are infrequently used and have specific targets. Direct application of herbicides to individual stumps, basal stem treatment, hack and squirt, and cut surface treatment are the usual methods of application used. Because these methods target individual stems (versus general broadcast spraying), direct application of these chemicals to bats is not likely. Situations where broadcast application of herbicides are used include conversion of cool season grass fields to warm season grasses and roadside vegetation control. In these situations, although considered temporary, herbicide treatment may cause a short term indirect effect to the Indiana bat by reducing the amount of vegetation and perhaps a reduction in insect populations after treatment of an area.

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. This biological opinion only addresses activities authorized , funded, or carried out on the Ouachita National Forest, that are under the jurisdiction of the Forest Service. Any future federal, state, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion will either be carried out by, or will require a permit from, the Forest Service and will require compliance with Section 7 of the ESA. Therefore, cumulative effects, as defined by the ESA will not occur.

## BIOLOGICAL OPINION

After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of forest management and other activities presented in the Ouachita National Forest's biological assessment, it is the Service's biological opinion that forest management and other activities authorized, funded, or carried out on the Ouachita National Forest, are not likely to jeopardize the continuing existence of the Indiana bat. Critical habitat for this species has been designated in Kentucky, Tennessee, Illinois, Indiana , Missouri, and West Virginia, However, this action does not affect those areas and no destruction or adverse modification of that habitat will occur as a result of Ouachita National Forest management activities.

## INCIDENTAL TAKE

Sections 4(d) and 9 of the Endangered Species Act (ESA), as amended, prohibits "take" of listed species without a special exemption. Take is defined broadly by the ESA to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined as an act that may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding feeding, or sheltering. Incidental take is any take of listed animals species that results from, but is not the purpose of, carrying out an other wise lawful activity conducted by the federal agency or the applicant, Under the terms of Section 7(b)(4) and 7 (o)(2) of the ESA, taking that is incidental

to and not intended as part of the agency action is not considered taking within the bounds of the ESA provided that such taking is in compliance with the incidental take statement.

The measures described below are non-discretionary, and must be implemented by the Forest Service (Ouachita National Forest) so that they become binding conditions of any permit issued to the applicant in order for the exemption of Section 7(o)(2) to apply. The Forest Service (Ouachita National Forest) has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (Ouachita National Forest) (1) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

***Amount or Extent of Incidental Take***

The Service anticipates that incidental take of Indiana bats as a result of forest management activities or other actions implemented on the Ouachita National Forest will be difficult to quantify and detect due to the bat's small population size. A maximum of nine hibernating bats have been recorded from one cave on the Ouachita National Forest and attempts to collect Indiana bats on the Ouachita National Forest during summer mist netting surveys have failed. Furthermore, the bats's small body size, formation of small, widely dispersed maternity colonies under loose bark or in cavities of trees, and unknown areal extent, and density of summer roosting populations within the Ouachita National Forest makes detection of take problematic.

The Ouachita National Forest is on the extreme western edge of the Indiana bat's range. Bear Den Cave, a hibernaculum where a maximum of nine Indiana bat have been found, is the only known Indiana bat site on the Ouachita National Forest. No Indiana bats have been found on the Ouachita National Forest during summer mist netting surveys. The hibernaculm is located in Forest Management Area 19 that includes 121,124 acres with management emphasis in support of recreational and wildlife objectives and with suitable and unsuitable areas for timber production. The suitable areas are not managed for timber production, but timber management activities can be done to support recreational and wildlife objectives compatible with the National Recreation Area and the special designations. Due to the known low incidence of Indiana bats on the Forest and the existing measures the Forest has taken to reduce the probability of direct bat mortality, the Service believes that taking of Indiana bats will be unlikely. However, due to the likelihood of unknown colonies or other potential habitat being present on the Ouachita National Forest, the Service cannot completely rule out the possibility of incidental take.

If any incidental take of Indiana bats does occur, it is expected to be in the form of killing, harming, or harassing. Cutting trees for harvest during the non-hibernation season or in preparation for other activities may result in mortality to females and young, or to individually roosting Indiana bats, if a particular tree that is cut contains a maternity colony or roosting bats. If the bats are not killed, the colony (or roosting individuals) may be forced to find an alternate roost or to abandon a roost in the area, possibly leading to lower reproduction or survival. Clearing an area for road construction or recreational development may result in alteration of roosting and/or feeding activities (i.e., the bats may have to fly farther to forage, seek alternate roosts, or they may be forced to abandon the area altogether). In addition, growing-season prescribed burns may result in burning of occupied roost trees. Smoke generated during prescribed burns could also stress or kill roosting bats. Burning may cause a

maternity colony or individual roosting bat to abandon a traditionally used maternity site. Treatment of areas with herbicides is not expected to result in incidental take of Indiana bats since individual stem treatments are the only application methods used. If other herbicides application methods are used (e.g., foliar spray from back pack for spot treatment), the Service should be contacted to determine if additional measures are needed to minimize the potential for incidental take.

Monitoring to determine take of individual bats within an expansive area of forested habitat is a complex and difficult task. Unless every individual tree that contains suitable roosting habitat is inspected by a knowledgeable biologist before timber harvest begins, it would be impossible to know if a maternity colony or roosting Indiana bats are present in an area proposed for harvest. It would also be impossible to evaluate the amount of incidental take of Indiana bats unless a post harvest inspection is immediately made of every tree that has been cut or disturbed. Therefore, inspecting individual trees is not an efficient survey method to determine incidental take.

The Service believes the incidental take of Indiana bats could occur through the loss of currently unknown maternity colonies or roosting individuals in potential habitat on the Ouachita National Forest. The best method to determine the anticipated level of this incidental take is by the areal extent of potential roosting habitat affected.

Implementation of the Ouachita National Forest's wildlife management goals, objectives, standards, and guidelines (U.S. Forest Service 1990) has resulted in the Forest containing approximately 223,800 acres of hardwood forest over 70 years old with tree species suitable for potential Indiana bat roost sites. Including all forest types (pine, pine/hardwood, hardwood/pine, and hardwood), 31% (497,379 acres) of the forest is now over 70 year old and in 30 years this figure should increase to 53 % (850,357 acres).

The Service anticipates the taking of Indiana bats from activities (e.g., timber sales, road construction, prescribed burning, development and maintenance of recreational areas, special uses, etc.) resulting from the annual removal or disturbance of up to 16,200 acres of the most suitable potential Indiana bat habitat (hardwood forest > 70 years old) contained within the different forest types (pine, pine/hardwood, hardwood/pine, and hardwood). Based on information provided in the ALRMP (U.S. Forest Service 1990) and the Programmatic Biological Evaluation for the Ouachita National Forest (U.S. Forest Service 1997), the annual loss of hardwood forest over 70 years old is expected to occur from the following activities:

12,200 acres to commercial timber harvest,

500 acres to wildlife management and road construction, and

3,500 acres impacted by prescribed burns.

16,200 total acres of hardwood forest > 70 years old

However, since the pine forest type can consists up to 30% hardwood and 70% pine, a take of 16,200 acres of hardwood forest > 70 years old could be equivalent to 54,000 acres of pine forest type > 70 years old, including 16,200 acres of hardwood. In addition, because the pine/hardwood forest type can contain up to 49% hardwood and 51% pine, a 16,200 acre take of hardwood > 70 years old in this forest type could be up to 33,100 acres of pine/hardwood forest > 70 years old. Take of a combination of these forest types may be possible, as long as an overall take of hardwood > 70 years

old does not exceed 16,200 acres. The annual level of anticipated incidental take represents 7.3% of the most suitable Indiana bat habitat (223,800 acres of hardwood forest > 70 years old) on the Ouachita National Forest. The likelihood for loss of potential habitat, and consequent taking of Indiana bats, is significantly reduced through implementation of the of existing Ouachita National Forest standards and guidelines.

*Effect of the Take*

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Indiana bat or destruction or adverse modification of critical habitat.

*Reasonable and Prudent Measures*

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Indiana bat:

1. Proposed management activities will be planned, evaluated and implemented consistent with measures developed to protect the Indiana bat and maintain, improve, or enhance its habitat. These measures include, but are not limited to, the Ouachita National Forest standard and guidelines found in the Ouachita National Forest ALRMP and terms and conditions outlined in the biological opinion.

2. The Ouachita National Forest will monitor timber sales and other activities to determine if these measures are being implemented and if incidental take occurs.

3. The Ouachita National Forest will continue its efforts to determine use of the Ouachita National Forest by Indiana bats during the hibernation, summer roosting, maternity, and pre-hibernation seasons.

*Terms and Conditions*

In order to be exempt from the prohibitions of Section 9 of the ESA, the Forest Service (Ouachita National Forest) must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline the required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. In order to promote potential summer roost trees and maternity sites for the Indiana bat throughout the Ouachita National Forest, Timber activities will:

   (a) Provide and designate hardwood and hardwood/pine forest types, age 50 and older at the approximate rate of 20 percent on a per-compartment basis.

   (b) Retain den tree clumps of deciduous trees at a rate of one-half acre per 20 acres of even-aged regeneration cutting. Where possible, locate clumps around existing den trees. Large den trees (18" dbh or greater) will be retained wherever they occur.

   (c) Retain at least two snags per acre, minimum 12" dbh with an objective of 16" dbh or larger, in regeneration areas. Snags may be created at greater densities, if needed. Retain existing snags during intermediate treatment (thinnings) and

wildlife habitat improvement activities. A tree with < 10% live canopy should be considered a snag.

(d) Retain or develop mature growth hardwood habitat (100 years old or greater) and mature growth pine habitat (80 years old or greater) within each compartment at a rate of 5 percent each.

2. Any active roost trees identified on the Ouachita National Forest will be protected and managed until such time they no longer serve as a roost (e.g., loss of exfoliating bark or cavities, blown down, or decay). Removal of known Indiana bat roost trees will be avoided, except as specified below. In the event that it becomes absolutely necessary to remove a known Indiana bat roost tree, such a removal will be conducted, through informal consultation with the Service, during the time period when the bats are likely to be in hibernation (November 15 through March 31). Trees identified as immediate threats to public safety may, however, be removed at any time.

3. Hibernacula and fall swarming areas if found to exist within the Ouachita National Forest will be protected by implementing the following measures:

(a) Primary area: Each Indiana bat hibernaculum will have a primary buffer consisting of a radius of no less than 0.8 km (0.5 miles). No disturbance resulting in the potential taking of an Indiana bat will occur within this buffer. Disturbance includes, but is not limited to, timber harvesting and road construction. Prescribed burning road maintenance, and pesticide use will be

evaluated to determine direct, indirect, and cumulative effects on Indiana bats and the hibernacula.

(b) Secondary area (fall swarming and foraging area): A secondary buffer of approximately 2.4 km (1.5 miles) will be established around the primary buffer. The actual area will be determined by on-the-ground conditions and topography. Within the area, the following management activities can occur: regeneration timber sales (no clear cutting), thinning, road construction or reconstruction, prescribed burning, trail construction/reconstruction, special uses, and limited pesticide use. However, each proposed project will be evaluated to determine the direct, indirect, and cumulative effect on Indiana bats and the hibernacula.

4. Monitoring of timber sales and other activities will be implemented as follows:

(a) Timber sale administrators or biologist will conduct and report normal inspections of all timber sales to the Ouachita National Forest to ensure that measures defined in the terms and conditions have been implemented and administer provisions for protecting residual trees. (Residual trees are those trees not designated for cutting under provisions of the timber sale contract.) Unnecessary damage to residual trees will be documented in sale inspection reports and proper contractual or legal remedies will be taken. The Ouachita National Forest will include this information in their annual monitoring reports. These will be made available to the Service, if requested.

(b) Informal consultations among the Service and the Ouachita National Forest will occur as needed in order to review and determine any need to modify provisions of the biological opinion, and other issues regarding the Indiana bat.

5. The Ouachita National Forest will continue its efforts to determine use of the Forest by Indiana bats during the hibernation, summer roosting/maternity, and pre-hibernation seasons by implementing the following research and monitoring needs. Selection of sites for future monitoring and research will be left to the discretion of the Ouachita National Forest's biologist in consultation with the Service. The Service believes that implementation of the following terms and conditions are necessary to evaluate the underlying assumptions made on Indiana bat presence and characterized use of the Ouachita National Forest. Implementation of these terms and conditions, in turn, will provide a more site-specific measure of the protective adequacy of the conservation measures for the Indiana bat on the Ouachita National Forest. These needs include the following:

(a) Cave Site: The biennial surveys of the known Indiana bat hibernaculum shall continue following the protocol of the Indiana Bat Recovery Team. If new Indiana bat hibernacula are found, they also shall be monitored biennially. If a gate is constructed on a hibernacula, yearly surveys shall be conducted the first three years following construction to determine the effects of the gate on all bat species. Thereafter, monitoring will continue biennially according to the Indiana bat Recovery Team protocol;

(b) Roost Trees: If any roost trees are found, they will be surveyed along with the associated foraging areas. The habitat at these sites will be characterized and quantified. These habitat data will be used to modify the existing management plan;

(c) Maternity Sites: If maternity sites are found, they will be protected along with associated roosts and foraging areas. The habitat at these sites will be characterized and quantified. These habitat data will then be used to assist in protecting existing sites and locating additional sites;

(d) Summer Foraging Areas: If Indiana bats are found to use the Ouachita National Forest during the summer, studies and monitoring activities shall identify the forest types and structure used for foraging by Indiana bats. Habitat will be characterized and quantified at both the local and landscape level. These habitat parameters will be used to develop management strategies for the protection, maintenance, and promotion of foraging areas;

(e) Fall Swarming and Foraging Areas; The identification of the areas used by the bats in the fall is warranted for the overall protection and maintenance of the wintering population. Monitoring shall be conducted to identify the major foraging areas used by Indiana bats during the swarming period. The habitat used by the bats will be characterized and quantified. Using these habitat parameters and actual foraging ranges, management strategies for protection of swarming areas will be identified and implemented.

6. Prescribed burns will be conducted, whenever possible, during the winter and early spring when Indiana bats are hibernating. However, burning plans should be coordinated with ecosystem restoration and management of other federally-listed species, such as the red-cockaded woodpecker, that may benefit from growing season fires to open the understory. Standards and guidelines contained in the Ouachita National Forest ALRMP will be followed to protect any known hibernacula in the vicinity of the area to be burned.

7. Care must be taken in handling dead specimens of listed species that are found in the project area to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens the finder has responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessary disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead, injured, or sick specimen of an endangered or threatened species, initial notification must be made to the nearest U.S. Fish and Wildlife Service Law Enforcement Office (Bob Germany, Special Agent, 222 South Houston, Suite A, Tulsa, Oklahoma 74127, 918-581-7469). Additional notification should be made to the nearest U.S. Forest Service Special Law Enforcement Officer (Otis Burdin, Supervisory Law Enforcement Officer, P. O. Box 1270, Hot Springs, AR 71902, 501-321-5361.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might other wise result from the proposed actions. The Service anticipates that management of the Ouachita National Forest will result in the incidental take of an undeterminate number of Indiana bats and the incidental take of potential habitat (hardwood forest > 70 years old) on no more than 16,200 acres annually. The expected actions and acres causing the annual take of potential habitat are: (1) commercial timber harvest - 12,200 acres; (2) wildlife management and road construction - 500 acres; and (3) prescribed burns - 3,500 acres.

If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring review of the reasonable and prudent measures provided. The Forest Service (Ouachita National Forest) must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

## CONSERVATION RECOMMENDATION

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or the develop information.

The Service, therefore, recommends that the Ouachita National Forest implement the following conservation measures for the benefit of the Indiana bat:

1. To promote potential summer roost trees and maternity sites for the Indiana bat throughout the Ouachita National Forest, Timber activities will, on average, a minimum of six roost trees, snags, or potential roost trees per acre. Potential roost trees are Class I and/or Class II tree species greater than 9 inches dbh (Romme et al. 1995).

2. The Ouachita National Forest should initiate the development and implementation of individual cave management plans for all active Indiana bat hibernacula within the forest. These plans shall be developed for any new hibernacula, if they are found.

3. Create drinking water sources for bats in areas where no reliable sources of drinking water are available. This recommendation should not be implemented where it would damage wetlands and wetland dependent species (i.e., damage to natural springs and seeps).

4. Ouachita National Forest biologists should conduct training for employees regarding bats in the National Forest. Training should include sections on bat identification, biology, habitat requirements, and sampling techniques.

5. If Indiana bat maternity colonies are located on the Ouachita National Forest, biologists are encouraged to conduct habitat suitability studies in the vicinity of each colony site.

The findings of these studies will be useful when the Indiana bat Habitat Suitability Index (HSI) model (Romme et al. 1995) or other appropriate model is reviewed and revised by the Service and Indiana Bat Recovery Team. When the new draft HSI model is ready for field testing, these studies would contribute toward validation of the model or reveal the need to modify variables throughout the Indiana bat's range. Once the draft HSI model is complete, the results could then be used by biologists during biological evaluations or assessments conducted for future management actions.

6. Survey a historic Indiana bat cave near Honobia, Oklahoma, near a recent land transfer to the Forest Service, to determine use by Indiana bats. If found to be used by Indiana bats, its acquisition should be investigated.

7. Informational and educational displays regarding all bats occurring on the Ouachita National Forest are strongly encouraged. The Service believes that such information would be invaluable in informing the public about the value of this misunderstood group of mammals.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service request notification of the implementation of any conservation recommendation.

# REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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